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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/565,598	07/28/2006	Javier Vazquez	GJE-003	2291

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EXAMINER	
KARACSONY, ROBERT	
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2821	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/565,598	VAZQUEZ ET AL.	
	Examiner	Art Unit	
	ROBERT KARACSONY	2821	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 September 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4,7-9,23 and 24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,7-9,23 and 24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. The following Office Action is in response to the Amendments received September 17, 2010. Claims 1-4,7-9, 23 and 24 are currently pending.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable by *Legay* (US 6,061,027, hereinafter *Legay*) in view of *Wilhelm* (US 2003/0142036, hereinafter *Wilhelm*).

Claim 1: *Legay* teaches a device for controlling electromagnetic radiation emitted by a structure, the device having a first surface (26, fig. 1) and a second reactive surface (24_2, fig. 1) defining a cavity therebetween, the first surface is an equipotential surface, and the second reactive surface presents a capacitive surface impedance and is comprised of a lattice array of conductors (22_1-22_7, figs. 1 and 2) disposed on a dielectric surface (24, fig. 1) such that the displacement between a conductor and any other conductor adjacent to it is small compared to the wavelength of the electromagnetic radiation thereby causing the array of conductors to represent an effectively continuous conductive surface to the electromagnetic radiation; an emitter (20, fig. 1) generating electromagnetic radiation between the first surface and the second

reactive surface, wherein the electromagnetic radiation within the cavity is radiated into the air through the second reactive surface.

Legay fails to teach the displacement between a conductor and any other conductor is no more than 1/10 of the wavelength. However, *Wilhelm* teaches the size, shape and periodicity of PBG elements all contribute to the material's operational frequency and bandwidth (paragraph [0059]). A particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have set the displacement between the PBG elements of the modified invention of *Legay* to no more than 1/10 of the wavelength, with a reasonable expectation of success, since the periodicity of the PGB elements is recognized as a result effective variable.

4. Claims 1-4 and 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable by *Legay* (US 6,927,729, hereinafter '729) in view of *Wilhelm*.

Claims 1-4 and 7-9: '729 teaches a device for controlling electromagnetic radiation emitted by a structure, the device having a first surface (Ground, see fig. 4) and a second reactive surface (40, see fig. 1) defining a cavity therebetween, the first surface is an equipotential surface, and the second reactive surface presents a capacitive surface impedance and is comprised of a lattice array of conductors (col. 5, lines 25-33) disposed on a dielectric surface such that the displacement between a conductor and any other conductor adjacent to it is small compared to the wavelength of the electromagnetic radiation thereby causing the array of

conductors to represent an effectively continuous conductive surface to the electromagnetic radiation, wherein a surface impedance of the second reactive surface is reactive, and

an emitter (41, fig. 4) generating electromagnetic radiation between the first surface and the second reactive surface, wherein the electromagnetic radiation within the cavity is radiated into the air through the second reactive surface.

'729 fails to teach the displacement between a conductor and any other conductor is no more than 1/10 of the wavelength. However, *Wilhelm* teaches the size, shape and periodicity of PBG elements all contribute to the material's operational frequency and bandwidth (paragraph [0059]). A particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have set the displacement between the PBG elements of the modified invention of '729 to no more than 1/10 of the wavelength, with a reasonable expectation of success, since the periodicity of the PGB elements is recognized as a result effective variable.

Claim 2: '729 teaches the dielectric surface is planar (fig. 4).

Claim 3: '729 teaches the electromagnetic radiation has more than one wavelength (col. 5, line 62).

Claim 4: '729 teaches the electromagnetic radiation has more than one polarization (col. 5, lines 58-61).

5. Claims 1-3 and 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Qiu et al.* (NPL Document, High-Directivity Patch Antenna with Both Photonic Bandgap Substrate and Photonic Bandgap Cover; 5 July 2001, hereinafter *Qiu*) in view of *Wilhelm*.

Claim 1: *Qiu* teaches a device for controlling electromagnetic radiation emitted by a structure, the device having a first surface (PGB substrate shown in fig. 1) and a second reactive surface (PGB cover shown in fig. 1) defining a cavity therebetween, and

an emitter (patch antenna shown in fig. 1) generating electromagnetic radiation between the first surface and the second reactive surface, wherein the electromagnetic radiation within the cavity is radiated into the air through the second reactive surface.

Qiu fails to explicitly teach the first surface is an equipotential surface, and the second reactive surface presents a capacitive surface impedance and is comprised of a lattice array of conductors disposed on a dielectric surface such that the displacement between a conductor and any other conductor adjacent to it is small compared to the wavelength of the electromagnetic radiation thereby causing the array of conductors to represent an effectively continuous conductive surface to the electromagnetic radiation. However, *Qiu* teaches that PGB structures can be a dielectric or a metallic periodic structure (see Part I. Introduction, lines 3-4). *Wilhelm* teaches various configurations of PGBs (see figs. 7, 9, 10 and 17), which include a lattice array of conductors disposed on a dielectric surface such that the displacement between a conductor and any other conductor adjacent to it is small compared to the wavelength of the electromagnetic radiation thereby causing the array of conductors to represent an effectively continuous conductive surface to the electromagnetic radiation such that the displacement between a conductor and any other conductor is no more than 1/10 of the wavelength of the

electromagnetic radiation. The claim would have been obvious because the substitution of one known element for another would have yielded predictable results to one of ordinary skill in the art at the time of the invention. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have substituted the PGB substrate and PGB cover of *Qiu* with the PGB structures of *Wilhelm* with a reasonable expectation of success, since the substitution of one known element for another would have yielded predictable results to one of ordinary skill in the art at the time of the invention.

Wilhelm further teaches the size, shape and periodicity of PBG elements all contribute to the material's operational frequency and bandwidth (paragraph [0059]). A particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have set the displacement between the PBG elements of the modified invention of *Qiu* to no more than 1/10 of the wavelength, with a reasonable expectation of success, since the periodicity of the PGB elements is recognized as a result effective variable.

The Examiner notes that although none of the cited prior art uses the exact claim language of being "equipotential," that does not indicate that the PBG structures are not of equipotential. The PBG structures are in fact equipotential. With regards to Qiu, the PBG substrate isn't electrically connected to a power source, thus inherently equal to the same voltage. Secondly, with regards to Wilhelm, the conductive patches are all electrically connected to the same ground plane, thus they are all equal to the same electrical potential, see fig. 14.

Claim 2: *Qiu* teaches the dielectric surface is planar (fig. 1).

Claim 3: The modified invention of *Qiu* in view of *Wilhelm* teaches the electromagnetic radiation has more than one wavelength (paragraph [0012] of *Wilhelm*).

Claim 7: The modified invention of *Qiu* in view of *Wilhelm* teaches the surface impedance of the second reactive surface is capacitive in some regions of the dielectric surface and inductive in the remaining regions of the dielectric surface (fig. 7 of *Wilhelm*).

Claim 8: The modified invention of *Qiu* in view of *Wilhelm* teaches the magnitude of the surface impedance of the second reactive surface varies at different positions on the dielectric surface (fig. 7 of *Wilhelm*).

Claim 9: The modified invention of *Qiu* in view of *Wilhelm* teaches the conductors of the second reactive surface are substantially periodically disposed with respect to each other on the dielectric surface (fig. 7 of *Wilhelm*).

6. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Qiu* in view of *Wilhelm* and *Sievenpiper et al.* (US 2003/0052834, hereinafter *Sievenpiper*).

Claim 4: The modified invention of *Qiu* in view of *Wilhelm* teaches all of the limitations of claim 1, as discussed above, however, fails to teach the electromagnetic radiation has more than one polarization. However, it was well known to the skilled artisan at the time of the invention to provide antenna systems with more than one polarization to enhance antenna reception. *Sievenpiper* teaches suitable antenna systems using high impedance surfaces comprising more than one polarization (fig. 1). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used more than one

polarization with the antenna system of *Qiu*, as taught by *Sievenpiper*, in order to have enhanced the antenna reception.

7. Claims 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over '729 in view *Wilhelm* and *Yamamoto et al.* (6,850,205, hereinafter *Yamamoto*).

Claim 23: '729 teaches the cavity is formed using a printed circuit board substrate with the second reactive surface being printed on a top layer of the substrate and a bottom layer which forms the first surface as an opposite boundary (fig. 4). '729 fails to teach plated through holes forming the sides of the cavity. However, it was well known to the skilled artisan at the time of the invention to form conductive sides out of plated through holes. *Yamamoto* teaches conductive sidewalls can be replaced with plated through holes (figs. 43 and 46). The claim would have been obvious because the substitution of one known element for another would have yielded predictable results to one of ordinary skill in the art at the time of the invention. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have substituted the sidewalls of '729 with plated through holes, since the substitution of one known element for another would have yielded predictable results to one of ordinary skill in the art at the time of the invention.

Claim 24: '729 teaches the emitter is printed on an inner layer of the substrate (fig. 4).

Response to Arguments

8. Applicant's arguments filed September 17, 2010 have been fully considered but they are not persuasive.

9. Regarding the arguments page 4, lines 7-16 of the Remarks, the Examiner respectfully disagrees with Applicants.

10. Particularly, Applicants argue that "adjusting the distance between elements of the reactive surfaces in Legay '027, Legay '729 and/or Qiu would have no effect on the ratio between the wavelength and the distance between elements of the reactive surface." The Examiner notes that the operational frequency of the PBG is different than the operational frequency of the radiator. Therefore, the operational frequency of the radiator will remain unchanged while the distance between the PBG elements are adjusted to the claimed condition of 1/10 of the wavelength of the electromagnetic radiation. To put it another way, the operational frequency of the PBG is independent of the operational frequency of the radiator, and changing the operational frequency of one does not, as a result, change the operational frequency of the other.

11. Regarding the arguments on page 5, paragraph 2 of the Remarks, the Examiner respectfully disagrees with Applicants.

12. Particularly, Applicants argue that "the present invention requires no photonic band gap structure and employs an entirely different mode of operation. In fact, the use of photonic band gap structures is highly undesirable in the present invention. The present invention results from the interaction between a radiating cavity and a periodic structure which has no band gap properties." In response to applicant's argument, it is noted that the mode of operation is not recited in the rejected claim(s). Therefore, although the present invention and the invention of the prior art are functionally distinct, the claims are not narrow enough that they overcome the teachings of the prior art. Although the claims are interpreted in light of the specification,

limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Conclusion

13. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ROBERT KARACSONY whose telephone number is (571)270-1268. The examiner can normally be reached on M-F 7:30 am - 5:00 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jacob Y. Choi can be reached on 571-272-2367. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/R. K./
Examiner, Art Unit 2821

/Jacob Y Choi/
Supervisory Patent Examiner, Art Unit 2821